

Abstract Submitted
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From microns to millimeters: New Diamond Cells for Multi-Megabar pressures and for Neutron Diffraction REINHARD BOEHLER, MUHTAR AHART, MALCOLM GUTHRIE, Geophysical Laboratory, Washington, DC, USA, JAMIE MOLAISON, CHRISTOPHER TULK, Neutron Sciences Directorate, ORNL, Oak Ridge, TN, USA — We developed new diamond cells for two extreme applications. One cell was designed to routinely study hydrogen above 2 Megabar (200 GPa) [2] by adopting the principle of deflecting plates reported earlier [1]. Neutron diffraction requires millimeter-sized samples even for the very high neutron fluxes available at the Oak ridge National Laboratory. We develop a new diamond cell capable of routinely reaching pressures of 80 GPa with culets of 1.5 mm. The diamonds were of only 4 mm diameter with conical design [3] using strongly supported seats made of polycrystalline diamond. We present new, high-quality data for D₂O showing signs of symmetrisation in ice [4]. Tests using very large CVD diamonds are in progress.

- [1] Zha, C., Z. Liu, M. Ahart, R. Boehier, and R. Hemley (2013) *Phys. Rev.Lett.* *in press*.
- [2] Boehler, R. (2006), *Rev of Sci Inst*, *77*, 115103.
- [3] Boehler, R., and K. De Hantsetters (2004) *High Pressure Research*, *24*, 391-396.
- [4] M. Guthrie, R. Boehier, C. Tulk, A. M. dos Santos, K. Li, J.J. Molaison, and R. Hemley (2013), *PNAS submitted*.

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